CLAIMS

1   1. An image display apparatus, in which a current TV field

2   period is divided into a plurality of sub-fields that are

3   respectively given luminance weights and are arranged in order

4   of time, and a gray-scale image for the current TV field period

5   is displayed by selecting a combination of sub-fields for each

6   pixel and sustaining a light emission state in each pixel during

7   the selected sub-fields, characterized in that

8   when arranged in ascending order of luminance weight, the

9   plurality of sub-fields include at least one sub-field whose

10   luminance weight is smaller than one-half of a luminance weight

11   of the next sub-field.

1   2. An image display apparatus, in which a current TV field

2   period is divided into a plurality of sub-fields that are

3   respectively given luminance weights and are arranged in order

4   of time, and a gray-scale image for the current TV field period

5   is displayed by selecting a combination of sub-fields for each

6   pixel and sustaining a light emission state in each pixel during

7   the selected sub-fields, characterized in that

8   when the plurality of sub-fields are arranged in ascending

9   order of luminance weight with an "i"th smallest luminance weight

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10 being denoted by W_i, the plurality of sub-fields are respectively

11 given such luminance weights that "n" exists where $W_1+W_1+W_2+...+$

12 $W_n < W_{n+1}$.

1   3. An image display apparatus, in which a current TV field

2 period is divided into a plurality of sub-fields that are

3 respectively given luminance weights and are arranged in order

4 of time, and a gray-scale image for the current TV field period

5 is displayed by selecting a combination of sub-fields for each

6 pixel and sustaining a light emission state in each pixel during

7 the selected sub-fields, characterized in that

8   when the plurality of sub-fields are arranged in ascending

9 order of luminance weight with a "j"th smallest luminance weight

10 being denoted by W_j, the plurality of sub-fields are respectively

11 given such luminance weights that "n" and at least two "i"s exist

12 where $W_i+W_1+W_2+...+W_n < W_{n+1}$.

1   4. An image display apparatus, in which a current TV field

2 period is divided into a plurality of sub-fields that are

3 respectively given luminance weights and are arranged in order

4 of time, and a gray-scale image for the current TV field period

5 is displayed by selecting a combination of sub-fields for each

6 pixel and sustaining a light emission state in each pixel during

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7   the selected sub-fields, wherein a coding pattern that specifies

8   a sum of luminance weights of all sub-fields in the current TV

9   field period is determined in accordance with a characteristic

10   of input pixel image signals corresponding to the image of the

11   current TV field period, characterized in that

12   when a reference TV field period is divided into a plurality

13   of sub-fields that are respectively given luminance weights, and

14   a ratio of the sum of luminance weights of all sub-fields in the

15   current TV field period to a sum of luminance weights of all sub-

16   fields in the reference TV field period is denoted by K, the

17   current TV field period includes

18   (a) one or more sub-fields whose luminance weights are

19   obtained by multiplying luminance weights of predetermined sub-

20   fields in the reference TV field period, respectively by

21   coefficients no greater than K, and

22   (b) one or more sub-fields whose luminance weights are

23   obtained by multiplying luminance weights of predetermined sub-

24   fields in the reference TV field period, respectively by

25   coefficients greater than K.

1   5. The image display apparatus of Claim 4,

2   wherein the coefficients no greater than K and the

3   coefficients greater than K are determined based on a rule which

4   is defined by an ascending order of luminance weight in the

5   reference TV field period.

1   6. The image display apparatus of Claim 5,

2   wherein the coefficients determined based on the rule are

3   coefficients that monotonously increase in ascending order of

4   luminance weight in the reference TV field period.

1   7. The image display apparatus of Claim 5,

2   wherein the coefficients determined based on the rule are

3   coefficients that increase in arithmetic progression in ascending

4   order of luminance weight in the reference TV field period.

1   8. The image display apparatus of Claim 5,

2   wherein the coefficients determined based on the rule are

3   coefficients that increase in geometric progression in ascending

4   order of luminance weight in the reference TV field period.

Claim 4

1   9. The image display apparatus of ~~any one of Claims 4 and 5~~,

2   wherein the sub-fields whose luminance weights are obtained

3   by the multiplications by the coefficients no greater than K

4   include a sub-field whose luminance weight is obtained by a

5   multiplication by a coefficient within a range that is fixed

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6   irrespective of which value K takes.

                                                    Claim 4
1   10. The image display apparatus of ~~any one of Claims 4 and 8~~,

2   wherein in each of at least two coding patterns among a

3   plurality of coding patterns from which the coding pattern of the

4   current TV field period is selected, at least two sets of three

5   luminance weights selected in ascending order of luminance weight

6   each meet the condition that the three luminance weights

7   approximately have a proportion selected from the group

8   consisting of "1:2:3", "1:2:4", "1:2:5", "1:2:6", "1:3:7",

9   "1:4:9" "2:6:12", and "2:6:16".

1   11. The image display apparatus of Claim 9,

2   wherein in each of at least two coding patterns among a

3   plurality of coding patterns from which the coding pattern of the

4   current TV field period is selected, at least two sets of three

5   luminance weights selected in ascending order of luminance weight

6   each meet the condition that the three luminance weights

7   approximately have a proportion selected from the group

8   consisting of "1:2:3", "1:2:4", "1:2:5", "1:2:6", "1:3:7",

9   "1:4:9" "2:6:12", and "2:6:16".

                                                    Claim 1
1   12. The image display apparatus of ~~any one of Claims 1 and 8~~;

2   wherein when S denotes the sum of luminance weights of all

3   sub-fields in the current TV field period and R is within a range

4   from 0 to S, a gray level corresponding to R is expressed by

5   selecting a combination of sub-fields whose luminance weights,

6   when added together, are closest to R.

1   13. The image display apparatus of Claim 9,

2   wherein when S denotes the sum of luminance weights of all

3   sub-fields in the current TV field period and R is within a range

4   from 0 to S, a gray level corresponding to R is expressed by

5   selecting a combination of sub-fields whose luminance weights,

6   when added together, are closest to R.

1   14. The image display apparatus of Claim 10,

2   wherein when S denotes the sum of luminance weights of all

3   sub-fields in the current TV field period and R is within a range

4   from 0 to S, a gray level corresponding to R is expressed by

5   selecting a combination of sub-fields whose luminance weights,

6   when added together, are closest to R.

1   15. The image display apparatus of Claim 11,

2   wherein when S denotes the sum of luminance weights of all

3   sub-fields in the current TV field period and R is within a range

4   from 0 to S, a gray level corresponding to R is expressed by

5   selecting a combination of sub-fields whose luminance weights,

6   when added together, are closest to R.

Claim 1

1   16. The image display apparatus of ~~any one of Claims 1 and~~

2   ~~8,~~

3   wherein the selection of the combination of sub-fields for

4   each pixel is controlled in accordance with one out of: an amount

5   of movement from an image of a past TV field period to the image

6   of the current TV field period; and an approximate value of the

7   amount of movement.

1   17. The image display apparatus of Claim 9,

2   wherein the selection of the combination of sub-fields for

3   each pixel is controlled in accordance with one out of: an amount

4   of movement from an image of a past TV field period to the image

5   of the current TV field period; and an approximate value of the

6   amount of movement.

1   18. The image display apparatus of Claim 10,

2   wherein the selection of the combination of sub-fields for

3   each pixel is controlled in accordance with one out of: an amount

4   of movement from an image of a past TV field period to the image

5   of the current TV field period; and an approximate value of the

6   amount of movement.

1   19. The image display apparatus of Claim 11,

2   wherein the selection of the combination of sub-fields for

3   each pixel is controlled in accordance with one out of: an amount

4   of movement from an image of a past TV field period to the image

5   of the current TV field period; and an approximate value of the

6   amount of movement.

1   20. The image display apparatus of Claim 12,

2   wherein the selection of the combination of sub-fields for

3   each pixel is controlled in accordance with one out of: an amount

4   of movement from an image of a past TV field period to the image

5   of the current TV field period; and an approximate value of the

6   amount of movement.

1   21. The image display apparatus of Claim 13,

2   wherein the selection of the combination of sub-fields for

3   each pixel is controlled in accordance with one out of: an amount

4   of movement from an image of a past TV field period to the image

5   of the current TV field period; and an approximate value of the

6   amount of movement.

1   22. The image display apparatus of Claim 14,

2   wherein the selection of the combination of sub-fields for

3   each pixel is controlled in accordance with one out of: an amount

4   of movement from an image of a past TV field period to the image

5   of the current TV field period; and an approximate value of the

6   amount of movement.

1   23. The image display apparatus of Claim 15,

2   wherein the selection of the combination of sub-fields for

3   each pixel is controlled in accordance with one out of: an amount

4   of movement from an image of a past TV field period to the image

5   of the current TV field period; and an approximate value of the

6   amount of movement.

1   24. The image display apparatus of Claim 16,

2   wherein in an image area where the amount of movement or the

3   approximate value of the amount of movement is large, such

4   combinations of sub-fields are selected that monotonously

5   increase in time with increasing gray levels of input pixel image

6   signals.

1   25. The image display apparatus of Claim 17,

2   wherein in an image area where the amount of movement or the

3   approximate value of the amount of movement is large, such

4   combinations of sub-fields are selected that monotonously

5   increase in time with increasing gray levels of input pixel image

6   signals.

1   26. The image display apparatus of Claim 18,

2   wherein in an image area where the amount of movement or the

3   approximate value of the amount of movement is large, such

4   combinations of sub-fields are selected that monotonously

5   increase in time with increasing gray levels of input pixel image

6   signals.

1   27. The image display apparatus of Claim 19,

2   wherein in an image area where the amount of movement or the

3   approximate value of the amount of movement is large, such

4   combinations of sub-fields are selected that monotonously

5   increase in time with increasing gray levels of input pixel image

6   signals

1   28. The image display apparatus of Claim 20,

2   wherein in an image area where the amount of movement or the

3   approximate value of the amount of movement is large, such

4   combinations of sub-fields are selected that monotonously

5   increase in time with increasing gray levels of input pixel image

6   signals.

1   29. The image display apparatus of Claim 21,

2   wherein in an image area where the amount of movement or the

3   approximate value of the amount of movement is large, such

4   combinations of sub-fields are selected that monotonously

5   increase in time with increasing gray levels of input pixel image

6   signals.

2   30. The image display apparatus of Claim 22,

        wherein in an image area where the amount of movement or the

    approximate value of the amount of movement is large, such

    combinations of sub-fields are selected that monotonously

'5   increase in time with increasing gray levels of input pixel image

6   signals.

1   31. The image display apparatus of Claim 23,

2   wherein in an image area where the amount of movement or the

3   approximate value of the amount of movement is large, such

4   combinations of sub-fields are selected that monotonously

5   increase in time with increasing gray levels of input pixel image

6   signals.

1   32. An image display apparatus, in which a current TV field

2   period is divided into a plurality of sub-fields that are

3   respectively given luminance weights and are arranged in order

4   of time, and a gray-scale image for the current TV field period

5   is displayed by coding input pixel image signals using different

6   coding modes that are switched in accordance with an amount of

7   movement from an image of a <u>past TV field</u> period to the image of

8   the <u>current TV field</u> period, wherein a combination of sub-fields

9   is selected for each pixel depending on the amount of movement,

10   and a light emission state is sustained in each pixel during the

11   selected sub-fields, characterized in that

12   the different coding modes are interspersedly applied to

13   input pixel image signals that correspond to an image area where

14   switching between the different coding modes is needed and that

15   show a predetermined characteristic.

1   33. An image display apparatus, in which a current TV field

2   period is divided into a plurality of sub-fields that are

3   respectively given luminance weights and are arranged in order

4   of time, and a gray-scale image for the current TV field period

5   is displayed by coding input pixel image signals using different

6   coding modes that are switched in accordance with an amount of

7   movement from an image of a past TV field period to the image of

8   the current TV field period, wherein a combination of sub-fields

9   is selected for each pixel depending on the amount of movement,

10   and a light emission state is sustained in each pixel during the

11   selected sub-fields, characterized in that

12   a signal used for switching between the different coding

13   modes is arbitrarily space-modulated so that the different coding

14   modes are interspersedly applied to input pixel image signals

15   that correspond to an image area where the switching between the

16   different coding modes is needed and that show a predetermined

17   characteristic.

34. An image display apparatus, in which a current TV field

period is divided into a plurality of sub-fields that are

3   respectively given luminance weights and are arranged in order

4   of time, and a gray-scale image for the current TV field period

5   is displayed by coding input pixel image signals using different

6   coding modes that are switched in accordance with an amount of

7   movement from an image of a past TV field period to the image of

8   the current TV field period, wherein a combination of sub-fields

9   is selected for each pixel depending on the amount of movement,

10   and a light emission state is sustained in each pixel during the

11   selected sub-fields, characterized in that

12   a signal used for switching between the different coding

13   modes is regularly space-modulated so that the different coding

14   modes are interspersedly applied to input pixel image signals

15   that correspond to an image area where the switching between the

16   different coding modes is needed and that show a predetermined

17   characteristic.

1   35. An image display apparatus, in which a current TV field

2   period is divided into a plurality of sub-fields that are

3   respectively given luminance weights and are arranged in order

4   of time, and a gray-scale image for the current TV field period

5   is displayed by coding input pixel image signals using different

6   coding modes which are switched in accordance with an amount of

7   movement from an image of a past TV field period to the image of

8   the current TV field period, wherein a combination of sub-fields

9   is selected for each pixel depending on the amount of movement,

10   and a light emission state is sustained in each pixel during the

11   selected sub-fields, characterized in that

12   a signal used for switching between the different coding

13   modes, when expressed pixel by pixel as a virtual image of a

14   matrix form in a plane, assumes a shape that contains a zigzag

15   as a main component which turns no more than once in a pixel, so

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16   that the different coding modes are interspersedly applied to

17   input pixel image signals that correspond to an image area where

18   the switching between the different coding modes is needed and

19   that show a predetermined characteristic.

1   36. The image display apparatus of Claim 35,

2   wherein the shape that contains the zigzag as the main

3   component has a pattern in which adjacent pixels alternate

4   between two states.

1   37. The image display apparatus of Claim 35,

2   wherein the shape that contains the zigzag as the main

3   component is a shape that randomly combines zigzags each of which

4   turns no more than once in a pixel.

1   38. The image display apparatus of ~~any one of Claims 32 and~~ *Claim 32*

2   ~~35,~~

3   wherein the input pixel image signals that show the

4   predetermined characteristic correspond to a non-edge image

5   area.

1   39. An image display apparatus, in which a current TV field

2   period is divided into a plurality of sub-fields that are

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3   respectively given luminance weights and are arranged in order

4   of time, and a gray-scale image for the current TV field period

5   is displayed by coding input pixel image signals using different

6   coding modes which are switched in accordance with an amount of

7   movement from an image of a past TV field period to the image of

8   the current TV field period, wherein a combination of sub-fields

9   is selected for each pixel depending on the amount of movement,

10   and a light emission state is sustained in each pixel during the

11   selected sub-fields, characterized in that

12   a modulation signal having periodicity corresponding to no

13   smaller than a pixel interval is applied to input pixel image

14   signals that correspond to an image area where switching between

15   the different coding modes is needed.

40. An image display apparatus, in which a current TV field

2   period is divided into a plurality of sub-fields that are

3   respectively given luminance weights and are arranged in order

4   of time, and a gray-scale image for the current TV field period

5   is displayed by coding input pixel image signals using different

6   coding modes which are switched in accordance with an amount of

7   movement from an image of a past TV field period to the image of

8   the current TV field period, wherein a combination of sub-fields

9   is selected for each pixel depending on the amount of movement,

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10   and a light emission state is sustained in each pixel during the

11   selected sub-fields, characterized in that

12   input pixel image signals corresponding to an image area

13   where switching between the different coding modes is needed are

14   modulated to shift a display position of the image area.

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